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Hisng-Tung WANG, *et al.*	:	
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For: APPARATUS HAVING A LIGHT SOURCE FOR A TRANSPARENT SHEET OF A SCANNER

PRELIMINARY AMENDMENT

Assistant Commissioner For Patents
Washington, DC 20231

Dear Sir:

Preliminary to examination of the instant application, please enter the following amendments and remarks:

IN SPECIFICATION:

Page 1 line 3 change the header "BACKGOUND OF THE INVEINTION" to --BACKGROUND OF THE INVENTION--

Page 5 line 6 change the header "DETIALED DESCRIPTION OF PREFERRED EMBODIMENT" to --DETAILED DESCRIPTION OF PREFERRED EMBODIMENT--

REMARKS

The foregoing Preliminary Amendment is submitted in order to correct minor spelling errors in the Specification.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached pages are captioned "Mark-Up Version Showing Changes" for your reference.

Respectfully submitted,

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Apparatus Having a Light Source for a Transparent Sheet of a Scanner

Background of the Invention

[BACKGOUND OF THE INVEINTION]

1. Field of the Invention

The invention relates to an apparatus having a light source for a transparent sheet, especially to an apparatus having a light source for a transparent sheet of a scanner with lower cost and highly uniform illumination.

2. Description of the Prior Art

The technology of obtaining the digital data by a scanner to scan the paper is highly developed and the scanner scans the transparent sheet such as transparency, negative, and slides by appropriate light source ("Transparency Adaptor, TA") to provide additional light rays. The structure of "Transparency Adaptor" describes as follow:

Refer to Fig 1 A & 1B, a conventional scanner 1 comprises a lower shell object 10 and a upper shell object 11, the lower shell object 10 usually has a imagine adopter module 12, a transmission motor 14 and a transmission axle 15; the imagine adopter module 12 has a lamp 120, a reflective plate 121, a lens 122 and an imagine sensor device 123; the scanner 1 scans the reflective sheet and obtains a digital data by only using the aforementioned components, the detailed steps are not mentioned here. If the user wants to scan the transparent sheet, a "Transparency Adaptor" 13 should be installed into the upper shell object 11. It is clearly shown in Fig 1 B, the "Transparency Adaptor" 13 has a lamp 130, a transmission motor 131 and a transmission axle 132. When the transparent sheet 2 is placed on the scanning platform 101, the light rays produced by the lamp 131 pass through the transparent sheet 2 and the imagines of the transparent sheet pass through the reflective plate 121, the lens 122 and are formed in the imagine sensor device 123. Then the imagine sensor device 123 converts the imagines into the digital data for output. Then the transmission motor 14 drives the imagine adopter module 12 to move along the direction of the transmission axle 15 (as the arrow shown in Fig 1B), in the meantime, the lamp 130 of the "Transparency Adaptor" 13 is driven synchronally by the transmission motor 131 and moved forward along

the direction of the transmission axle 132. By the actions aforementioned, each portion of the transparent sheet has been exposed and converts digital data for output.

The other conventional Transparency Adaptor is as shown in Fig 2A & 2B. Most components of the scanner 1 as shown in the Fig 2A & 2B are as same as those of the scanner 1 as shown in the Fig 1A & 1B, the difference is that the transparency adaptor 16 of the upper shell object 11 comprises a lamp 160 and a light-conducting plate 161. The light-conducting plate 161 is used to distribute uniformly the light rays produced by the lamp 160, so the transparency adaptor 16 provides the light rays for the transparent sheet 2 without driven by a transmission motor. We obtain easily the digital data output by the imagine sensor device 123, when the transmission motor 14 drives the imagine adopter module 12 to move along the direction of the transmission axle 15.

The first kind of the conventional Transparency Adaptor aforementioned uses a lamp illuminating the reflective sheet directly, the light rays for the imagine sensor device 123 is stronger and the digital data output is better, but it needs a lot of components and complex structures, such as the transmission motor and the transmission axle, which increase the difficulty and the cost of combining the scanner. Oppositely, the second kind of the Transparency Adaptor which can decrease the difficulty and the cost of combining the scanner, but the light rays passing through the light-conducting plate is not efficiently and uniformly, the quality of the digital imagine output from the imagine sensor device cannot be improved.

SUMMARY OF THE INVENTION

It is therefore the object of the present invention is to improve the quality of the digital imagine output from the imagine sensor device by obtaining highly uniform light rays for a transparent sheet of a scanner.

It is the other object of the present invention is to provide an apparatus having a light source for a transparent sheet of a scanner with low cost and easily combining.

Base on the aforementioned idea, the present invention provides an apparatus having a light source for a transparent sheet of a scanner that comprises a shell object, a light-emitting element inside the shell object for emitting light, a reflective plate which is between the shell object and the light-emitting element to reflect the light emitted by the light-emitting element, and an aperture on the first predetermined position of the reflective plate for decreasing the illumination of the first predetermined position.

Base on the idea aforementioned, wherein the light-emitting element is a lamp or a LED array.

Base on the idea described above, wherein the reflective plate is in the arc or "ㄇ" shape.

Base on the idea aforementioned, wherein an aperture's central part is wider than its two ends.

Base on the idea described above, wherein the apparatus having the light source for a transparent sheet of a scanner further comprises a spreading plate which is a thin film between the light-emitting element and the reflective plate to cover the light-emitting element for spreading the light rays passing through it.

Base on the idea aforementioned, wherein the spreading plate has a plurality of perforations for decreasing illumination of the second predetermined position by increasing the perforations of the second predetermined position.

Base on the idea described above, wherein the apparatus having the light source for a transparent sheet of a scanner further comprises a protective plate made of the material pervious to light, which is at the surface of the shell object to protect the light source for a transparent sheet of a scanner.

Base on the idea aforementioned, wherein the first and second predetermined positions are at the central part of the light-emitted element.

BRIEF DESCRIPTION OF THE DRAWING

The foregoing and other aspects of the invention will become more apparent upon a description of the best mode for carrying out the invention, as rendered below. In the description to follow, reference will be made to the accompanying drawing, in which:

Fig 1A is a schematic view of the conventional scanner with the first kind of the Transparency Adaptor.

Fig 1B is a sectional schematic view of the conventional scanner with the first kind of the Transparency Adaptor.

Fig 2A is a schematic view of the conventional scanner with the second kind of the Transparency Adaptor.

Fig 2B is sectional schematic view of the conventional scanner with the second kind of the Transparency Adaptor.

Fig 3 is a schematic view of the scanner with the light source for a transparent sheet of a scanner of the present invention.

Fig 4A is a sectional schematic view of the apparatus having the light source for a transparent sheet of a scanner of the present invention.

Fig 4B is a schematic view of the reflective plate of the apparatus having the light source of this invention.

Fig 4C is a distributed figure of the brightness of the light rays produced by the apparatus having the light source for a transparent sheet of a scanner of the present invention.

Fig 5A is a sectional schematic view of the other preferred embodiment of the apparatus having the light source for a transparent sheet of a scanner of the present invention.

Fig 5 B is a schematic view of the reflective plate in the other preferred embodiment of the apparatus having the light source for a transparent sheet of a scanner of the present invention.

Fig 5 C is distributed figure of the brightness of the light rays produced by the apparatus having the light source for a transparent sheet of a scanner of the other preferred embodiment to the present invention.

Fig 6 is a schematic view of the spreading plate of the apparatus having the light source for a transparent sheet of a scanner of the present invention.

Detailed Description of Preferred Embodiment

[DETIALED DESCRIPTION OF PREFERRED EMBODIMENT]

First of all, refer to the Fig 3, which is the schematic view of the scanner with a light source for a transparent sheet of a scanner of this present invention. As shown in this Fig, the scanner 3 composes the lower shell object 30 and the upper shell object 31, the components of the lower shell object 30 (such as the imagine adopter 32) are as same as those of the conventional scanner; but for the reason of improving the imagines' quality of the transparent sheet of the present invention, the transparency adaptor 33 within the upper shell object 31 uses a lamp 330 to emit the light rays and the reflective plate 331 to focus and reflect the light rays onto the scanning platform 301 for scanning the transparent sheet. Below is the further detailed describing of the transparency adaptor of the present invention:

The preferred embodiment of the transparency adaptor 33 of the present invention is as shown in the Fig 4A. In which, the apparatus having the light source for a transparent sheet of a scanner 33 of the present invention has a lamp 330, a reflective plate 331, a spreading plate 332 and a protective plate 333 and all of them are inside the upper shell object 31; the lamp 330 as the light source emits the light rays for scanning the transparent sheet because the lamp 330 has the advantages of adequate brightness and lower cost, which is the appropriate light source for the present invention. Besides, a reflective plate 331 is put behind the lamp 330 and between the upper shell object 31 and the lamp 330. The sectional schematic view of the reflective plate 331 is in the arc shape as shown in Fig 4 A and Fig 4 B, which can reflect the light rays from the lamp 330 concentrating onto the scanning platform 301. For the brightness of the central part is brighter than the two ends of the lamp as the dotted line in the brightness distribution figure shown in Fig 4C, therefore, an aperture 334, its central part is wider than the two ends, is on the reflective plate 331 as shown in Fig 4B, the aperture 334 leaks some light rays of the lamp 330 and prevent them from reflecting onto the scanning platform 301, which balances the brightness of the central part and the two ends of the lamp 330, as the line in the brightness distribution

figure shown in Fig 4C, the balanced brightness for scanning the transparent sheet (not shown)is helpful to improve the quality of the digital data.

Furthermore, the spreading plate 332 of the apparatus having the light source for a transparent sheet of a scanner 33 is a thin film with the function to spread uniformly the light passing through it. As shown in Fig 6, it is between the lamp 330 and the reflective plate 331 and covers the lamp 330. The surface of the spreading plate 332 has several perforations for balancing the brightness of the light rays emitted by the lamp 330, the present invention increases the perforations of the spreading plate 332 relatively to the brighter position of the lamp 330 (such as the central part of the lamp 330) to decrease the illumination, so the brightness of the light rays wherein will be lowered. It is opposite that decreases the perforations of the spreading plate 332 relatively to the darker location of the lamp 330 (such as the two ends of the lamp 330) to raise the illumination, so the brightness of the light rays will be increased. By the actions described above, which can balance the light rays for the scanning platform, the quality of the digital data output from the present invention will be improved as well.

In addition, the apparatus having the light source for a transparent sheet of a scanner 33 of the present invention has a protective plate 333, which is the material made of pervious to light (such as glass), is on the surface of the upper shell object 31 to protect the components of the apparatus having the light source for a transparent sheet of a scanner 33.

The other preferred embodiment of the apparatus having the light source for a transparent sheet of a scanner 33 of the present invention is as shown in Fig 5A, wherein the most parts of the apparatus having the light source for a transparent sheet of a scanner 33 of the present invention are as same as those described above, but the sectional schematic view of the reflective plate 331' is in the "ㄇ" shape as shown in Fig 5A and 5B, which can reflect the light rays from the lamp concentrating onto the scanning platform 301, and the reflective plate 331' of this preferred embodiment is easier to compose; but the brightness of the lamp 330 passing through the reflective plate 331' will be distributed as the dotted line shown in Fig 4C, therefore, the present invention places two apertures 334' on the reflective plate 331', these apertures' 334' central parts are also wider than the two ends as shown in Fig 5B, which can decrease the brightness of the central part of the lamp 330 and balance the distribution of the

brightness as the line shown in Fig 5C, it is helpful to improve the quality of the digital data output by the balanced distributing brightness of light rays for scanning the transparent sheet.

With no doubt, the lamp 330 of the present invention as described above may be replaced by a LED array (not shown), which can meet the purpose of the present invention.

As those described above, the present invention uses a lamp as the light source, a reflective plate to reflect the light rays onto the scanning platform, the aperture to improve the light rays uniformly, in the meantime, it uses the spreading plate to finely adjust the distribution of the light rays uniformly. There are many advantages for the present invention that the components are simple, the cost is low, and it is more practical and can highly improve the performance of a scanner to scan the transparent sheet.

Aforementioned are the preferred embodiments of the present invention, these preferred embodiments are used to explained but limit the claim of the present invention. The scope of the present invention is defined by the claims described as follow. The variations and / or modifications according to the claims of the present invention should be contained by the present invention.

What is claimed is:

1. An apparatus having a light source for a transparent sheet of a scanner comprising:

a shell object;

a light-emitting element inside said shell object for emitting a light rays;

a reflective plate being between said shell object and said light-emitting element for reflecting said light emitting from said light-emitting element; and

an aperture on a first predetermined position of said reflective plate to decrease the illumination of said first predetermined position.

2. The apparatus as claimed in claim 1, wherein said light-emitting element is a lamp.

3. The apparatus as claimed in claim 1, wherein said light-emitting element is a LED array.

4. The apparatus as claimed in claim 1, wherein said reflective plate is in arc shape.

5. The apparatus as claimed in claim 1, wherein said reflective plate is in "ㄇ" shape.

6. The apparatus as claimed in claim 1, wherein the central part of said aperture is wider than the two ends.

7. The apparatus as claimed in claim 1, wherein said first predetermined position is at the central part of said light-emitting element.

8. The apparatus as claimed in claim 1 further comprising:

a spreading plate which is a thin film between said light-emitting element and said reflective plate to cover said light-emitting element for spreading said light rays passing through it.

9. The apparatus as claimed in claim 8, wherein said spreading plate includes a plurality of perforations to decrease illumination of the second predetermined position by increasing of said perforations of the second predetermined position.

10. The apparatus as claimed in claim 9, wherein said second predetermined position is at the central part of said light-emitting element.

11. The apparatus as claimed in claim 1 further comprising:

a protective plate made of the material pervious to light is at the surface of said shell object for protecting said apparatus.

ABSTRACT OF THE DISCLOSURE

The present invention relates to an apparatus having a light source for a transparent sheet of a scanner that includes a lamp, a reflective plate, a spreading plate and a protective plate. The light rays emitted by the lamp are used to scan a transparent sheet, the reflective plate in the arc shape reflects the light rays onto the scanning platform and there is an aperture on the predetermined position of the reflective plate to decrease the illumination for distributing uniformly the light rays. Besides, the spreading plate has a plurality of perforations to advance the light rays distributed uniformly. The protective plate made of the material pervious to light protects the components of this invention. As those described above, there are many advantages for the present invention, such as the structure is simple, the cost is low, and is much practical and can highly improve the performance of a scanner for a transparent sheet.